IPV4 Header related Examples

This is IPv4

45 00 00 44 ad 0b 00 00 40 11 72 72 ac 14 02 fd ac 14 00 06

Version: 4
Header length: 5 (20 bytes)
TOS: 0x00
Total Length: 0x0044 (68 bytes)
Identification: 0xad0b
Flags and Fragments: 0x0000
TTL: 0x40 (64 hops)
Protocol: 0x11 (UDP)
Header Checksum: 0x7272
Source: 0xac1402fd (172.20.2.253)
Destination: 0xac140006 (172.20.0.6)

Example:
If value at HLEN field is 1101 find the size of option and padding field.
Solution HLEN Value = 1101 = 13 Bytes.
Total No. of Bytes in the Header = 13 x 4 = 52 Bytes.
The first 20 bytes are the main header and the next 32 bytes are the options + Padding Field.

Example:
In an IPv4 packet, the value of HLEN is 1000 in binary. How many bytes of options are being carried by this packet?
Solution The HLEN value is 8, which means the total number of bytes in the header is 8 × 4, or 32 bytes. The first 20 bytes are the base header, the next 12 bytes are the options.

Example:
In an IPv4 packet, the value of HLEN is 5, and the value of the total length field is 0x0028. How many bytes of data are being carried by this packet?
Solution The HLEN value is 5, which means the total number of bytes in the header is 5 × 4, or 20 bytes (no options). The total length is 40 bytes, which means the packet is carrying 20 bytes of data (40 − 20).

Example:
An IPv4 packet has arrived with the first few hexadecimal digits as shown.0x4a50000280001000001O2.. How many hops can this packet travel before being dropped? The data belong to which upper-layer protocol?
Solution To find the time-to-live field, we skip 8 bytes. The time-to-live field is the ninth byte, which is 01. This means the packet can travel only one hop. The protocol field is the next byte (02), which means that the upper-layer protocol is IGMP.

Example:
An IPv4 packet has arrived with the first 8 bits as shown: 01000010 The receiver discards the packet. Why?
Solution There is an error in this packet. The 4 leftmost bits (0100) show the version which is correct The next show the version, which is correct. The next 4 bits (0010) show an invalid header length (2 × 4 = 8). The minimum number of bytes in the header must be number of bytes in the header must be 20. The packet has The packet has been corrupted in transmission.